Nuclear Pharmacy APPE  
PHAR 9981

Preceptor:  
Experiential Site:  
Current semester/year:  
Office:  
Office Phone:  
Email:  
COURSE Prerequisites:  Fourth Year Status  
Credit hours:  6  
Course Title:  Nuclear Pharmacy APPE  

Purpose:  The purpose of this nuclear pharmacy APPE is to demonstrate an understanding of the basic principles of radiation physics, preparation of radiopharmaceuticals, operator safety, quality control, laboratory design, radiation monitoring equipment, clinical aspects, therapeutic and diagnostic applications of radiopharmaceuticals and diagnostic agents in pharmacy practice.

Goals and Objectives:  
1. Understand the basic principles of radiation physics  
2. Be able to explain the concept of ALARA  
3. Given any radiopharmaceutical, be able to explain how to safely compound it and perform quality control procedures  
4. Explain NRC regulations regarding the receipt, transportation, and disposal of radioactive materials  
5. Develop a working knowledge of the mathematics involved in nuclear medicine.  
6. Be able to use the decay equation and/or decay tables to calculate activity both forward and backward in time  
7. Understand generator kinetics, elution techniques and quality assurance of eluate.  
8. Demonstrate knowledge of the principles of operation and procedures for quality control of the instruments, equipment and devices used in a nuclear pharmacy  
9. Understand the biological effects of ionizing radiation on the body  
10. Be able to identify all the components of a radiopharmaceutical kit and identify the purpose of each ingredient  
11. Review the therapeutic and clinical aspects of radiopharmaceuticals and diagnostic agents  
12. Understand the principles and application of radiation monitoring equipment  
13. Be able to recommend an appropriate imaging agent and dose based upon liver and kidney function.  
14. Understand how nuclear pharmacy differs from traditional pharmacy practice.  
15. Demonstrate an ability to enter orders, prepare radiopharmaceutical kits, and dispense unit doses accurately.
Text: **Radiopharmaceuticals in Nuclear Pharmacy and Nuclear Medicine** by Kowalsky & Falen, Lecture notes available in white binder.

Activities:
- Staff the pharmacy from 1:30 am – 5:30 am Monday through Friday
- Staff the pharmacy at other times as requested by the pharmacist
- Attend Imaging Center scans

Evaluation:

<table>
<thead>
<tr>
<th>By the end of week:</th>
<th>You should review and understand the following lecture notes from the white binder:</th>
<th>You should be able to complete the following tasks with minimal guidance:</th>
<th>You should be able to give a 5-min verbal presentation on the following products:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lectures 1-3</td>
<td>Read survey meter accurately</td>
<td>Choletec (mebrofenin)</td>
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<td></td>
<td>Do constancy checks on survey meters and single channel analyzers</td>
<td>Kinevac (CCK)</td>
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<td></td>
<td>Practice with syringe shield</td>
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<tr>
<td>2</td>
<td>Lectures 4-6</td>
<td>Dose wrapping and shipping</td>
<td>Pulmolite (MAA)</td>
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<td></td>
<td>Practice with syringe shield</td>
<td>DTPA</td>
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<tr>
<td>3</td>
<td>Lectures 7-9</td>
<td>Be competent with syringe shield</td>
<td>Cardiolite (sestamibi)</td>
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<td></td>
<td></td>
<td>Mix a kit and dispense practice</td>
<td>Myoview (tetrofosmin)</td>
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<tr>
<td></td>
<td></td>
<td>doses</td>
<td>AdenoScan</td>
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<td></td>
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<td></td>
<td>LexiScan</td>
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<tr>
<td>4</td>
<td>Lectures 10-12</td>
<td>Mix 3 different kits and dispense doses without a blunt tip</td>
<td>Sulfur Colloid</td>
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<tr>
<td></td>
<td></td>
<td>accurately</td>
<td>UltraTag</td>
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<tr>
<td>5</td>
<td>Lectures 13-15</td>
<td>Mix all kits and dispense doses with a blunt tip accurately</td>
<td>Ceretec WBC tag</td>
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<td></td>
<td></td>
<td>In-111 oxine WBC tag</td>
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<tr>
<td>6</td>
<td>Lectures 16-17</td>
<td>Continue mixing and dispensing</td>
<td>MAG3</td>
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</tbody>
</table>

Students must also attend scans at Advanced Imaging as scheduled by the preceptor.

**Product Presentation**

Each presentation must cover:

- Generic and trade names for the product
- Kit composition and the chemical role of each component
- Radionuclide identity, type of emitter, half-life and energy (KeV)
- General clinical pharmacology (how does this stuff get where it’s going?)
- Indications for use
- Dosage and administration (common adult protocols)
- Contraindications
- Warnings/Precautions
- Pharmacokinetics (ADME)
- Radiation Dosimetry (which organ gets the largest dose of radioactivity?)
- Most common adverse events
- Special populations (pregnancy category, nursing, geriatrics, pediatrics)
Any special considerations for use (must elute generator and use tech within 30 minutes, etc)  
Kit prep procedures  
QC protocol  
Storage and expiration time

All this information can be gleaned from the package insert for each product – you will only need to pull primary literature if a more difficult, patient-specific issue presents itself. To get the package insert, simply do a web search (for example, search for “www.Cardiolite.com” or do a Google search for “Cardiolite package insert” – or ask how to find them if you’re having problems.

**Grading:**

Grading will be based upon regular attendance and active participation in rotation activities. Failure to attend scans at the Imaging Center will result in a drop of one letter grade.

**Important Notes:**

- Bring a lab coat with name tag
- Never wear shorts, skirts or open toed shoes
- You can wear whatever is comfortable when you come in at 1:30 am – but dress nicely when you go to scans
- HIPAA rules apply – shred ANYTHING with a patient name on it – DO NOT throw it away in the normal trash
- Never throw away anything with a radiation symbol or that has the word “radioactive” on it. These must be shredded.
- Sign in every morning and wear a dosimeter every time you enter the pharmacy. Take a reading on the pocket dosimeter before and after. Inform the pharmacist on duty if your exposure went up 5 or more mR in any single day.

**Faculty expectations of students:**

1. To attend regularly.
2. To be punctual, prepared and attentive.
3. To be willing to participate positively and constructively.
4. To understand and abide by the procedures, regulations, and schedules described in this syllabus including compliance with the policy for academic dishonesty
5. To display the attitudes, habits and values representative of a professional student/health professional.
6. To acquire knowledge in an independent manner.
7. To interact in a professional manner with patients and other healthcare workers.

**Student expectations of instructors:**

1. To be punctual, prepared, and enthusiastic.
2. To be genuinely concerned about the ability of the students to perform well.
3. To provide a structure which encourages student learning.
4. To have a commitment to student learning and provide a positive learning experience.
5. To be available at least through e-mail/cell phones.

**Assessment:**

The College has an ongoing assessment program. A requirement for accreditation, the program is designed to assure curricular effectiveness. The assessment program at the College of Pharmacy employs a variety
Confidentiality:

Pharmacy students must be in compliance with the Health Information Portability and Accountability Act (HIPAA). The Office for Civil Rights enforces the HIPPA Privacy Rule, which protects the privacy of individually identifiable health information; the HIPAA Security Rule, which sets national standards for the security of electronic protected health information; and the confidentiality provisions of the Patient Safety Rule, which protect identifiable information being used to analyze patient safety events and improve patient safety (US Department of Health & Human Services, HSS.gov).

All patient information, names, medical records, social security numbers, date of birth, and other identifiers will not be used, removed, or discussed for any reason outside the facility. Any breach of HIPPA will be grounds for removal from the facility and failure of the rotation. See Student Handbook under HIPPA.

The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

Mid-Point Performance Evaluation:

Preceptors must provide the student with a mid-point performance evaluation during the 3rd week of the six week rotation. Preceptors will provide specific recommendations for areas of improvement if necessary. Preceptors should report any student failing the mid-point evaluation to the Director of Experiential Education.

Academic dishonesty:

"Dishonest conduct is unacceptable." Students are expected to conduct themselves honestly in all academic and professional activities. Dishonest conduct includes but is not limited to cheating and plagiarism. Any form of dishonest conduct is punishable. Students should review the policies and procedures on academic dishonesty defined in the Idaho State University Student Handbook (Section II.A.3) and in the Faculty Staff Handbook (Part 6, Section IX.A) and in the College of Pharmacy Handbook.

Students with disabilities:

The Americans with Disabilities Act (ADA) is the civil rights guarantee for persons with disabilities in the United States. It provides protection for individuals from discrimination on the basis of disability. Idaho State University, in the spirit and letter of the law, will make every effort to make reasonable accommodations, according to section 504 of the Rehabilitation Act of 1973 and the ADA. Students with disability related needs should contact the Director of the Center for Students with Disabilities, Campus Box 8118, (208)282-3599. TTY 1-800-377-3529. In addition, the student must supply copies of official correspondence from the Center for Students with Disabilities to the Associate Dean of
the College of Pharmacy. Arrangements will then be made to notify individual module directors of the student's special needs

**Grounds for Dismissal:**
Consumption of alcohol or other substances of abuse at the pharmacy will be grounds for dismissal.

**Compensation Prohibited:**
Pharmacy students, while participating in any experiential activities to satisfy required hours stated in the College curriculum, shall not, under any circumstances, receive financial remuneration or compensation for hours obtained from experiential sites. Any hours in which the student is paid will not count toward fulfillment of the experiential experience.

**End Point Competencies:**

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<tr>
<th>Based on College of Pharmacy Endpoint Competencies 2010</th>
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<tbody>
<tr>
<td><strong>Ensure Appropriate Pharmacotherapy and Health Outcomes</strong></td>
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<tr>
<td>1. Collect relevant information from a medical record and organize it into a useable format.</td>
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<td>2. Efficiently gather relevant data from a patient interview.</td>
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<td>3. Perform basic aspects of physical assessment.</td>
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<td>4. Accurately assess the patient’s/caregiver’s self-management skills (i.e., medication adherence and/or ability to correctly use their drug regimen or device). Recognize the patient’s/caregiver’s level of health literacy.</td>
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<td>5. Identify patients at risk for adverse drug reactions.</td>
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<td>6. Accurately and efficiently identify all drug-related issues.</td>
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<td>8. Evaluate all rational therapeutic options.</td>
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<td>9. Determine the best pharmaceutical care plan for patients, including use of sound clinical judgment when data are incomplete.</td>
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<td>10. Articulate and justify patient-specific recommendations.</td>
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<td>11. Apply pharmacokinetic and/or pharmacodynamic principles and patient data to determine the most appropriate dosing regimen and/or drug delivery system for the patient.</td>
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<td>12. Appropriately utilize clinical literature to provide an evidence-based approach to patient-centered pharmaceutical care.</td>
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<td>13. Identify patient-specific monitoring parameters for all drug therapies.</td>
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<td>15. Provide accurate and useful drug information by defining the needs of the requestor, evaluating information using all appropriate resources, and effectively communicating a response.</td>
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<td>16. Recognize health care disparities and assure that individual members of a patient population receive appropriate pharmaceutical care services.</td>
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<td>17. Retain previously covered information and demonstrate level-appropriate knowledge base.</td>
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<td><strong>Dispense Medications and Devices</strong></td>
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<td>18. Provide counseling to patients and/or caregivers including proper instructions for the safe and effective use of medications and devices.</td>
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<tr>
<td><strong>Manage Health Systems</strong></td>
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<tr>
<td>19. Contribute to the pharmaceutical care system’s process for reporting and managing medication errors and adverse drug reactions</td>
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<tr>
<td><strong>Promote Health and Disease Prevention</strong></td>
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<td>20. Identify and provide effective health promotion and disease prevention services including educating patients about behaviors that promote health, maintain wellness, prevent and control disease.</td>
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<tr>
<td><strong>Display Professionalism</strong></td>
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<td>21. Accept responsibility for individual patient outcomes and give priority to patient well-being and safety even if it means making personal sacrifices.</td>
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